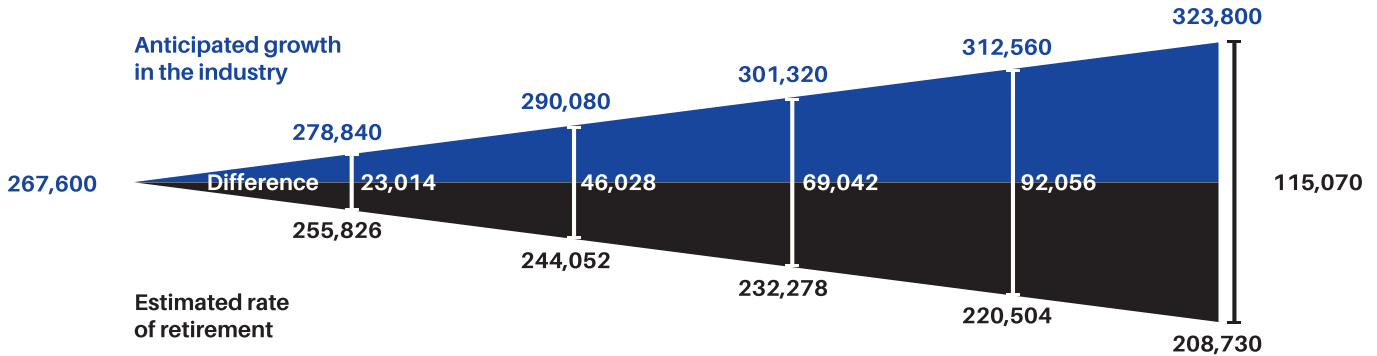


Copeland & NC3 Partnering to Address the Skilled Trades Gap



It's no secret that tradespeople are undervalued in this country, but what is perhaps less well known is just how dire the situation is when it comes to the skills gap in the HVACR trades. There are already approximately 110,000 unfilled HVAC technician jobs. Additionally, the industry can expect to lose 23,000 more jobs each year, which means in five years the industry will be 225,000 technicians short of what today's demand calls for.

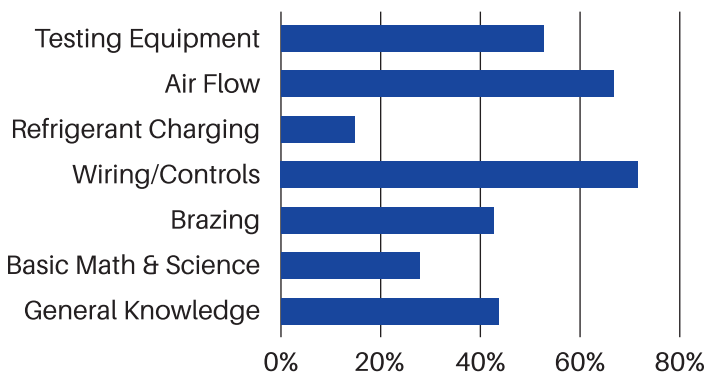
With baby boomers retiring, the ability to fill open positions has become a huge challenge. The current growth rate of employment for heating, air conditioning, and refrigeration technicians is at 15%. Some of the biggest pain points for HVACR employers are finding qualified technicians to fill the open roles, retaining technicians in the HVACR industry, and developing technicians for technologies and remote monitoring.

Mechanical contractors are reporting that 80% are hiring technicians who recently graduated an accredited HVACR program. 60% of those hires came from a technical school, with the remaining being split evenly between community colleges and high school skilled trades programs.

Even with formal training it is being found that there are areas where graduates are falling short of their expectations. These include electrical wiring and controls, monitoring airflow, and testing the operation of the units. Along with these specific topics there seems to be a shortage in general knowledge and basic understanding of math and science.

Copeland has led the HVACR industry for the past 100 years. Inventiveness is our unique combination of innovation and resourcefulness. It is the heart of what Copeland stands for and what we bring to solve every challenge. Our passion for progress is driven by the demands and changes our customers face and the opportunity to provide smart, sustainable technology and services.

Areas Missing in Student's Understanding of HVACR



COPELAND

Copeland scroll compressors have been installed over 200 million times and the technology remain at the forefront for HVACR applications, impressing contractors and OEMs with its superior efficiency, proven reliability, and ease of installation.

We are a dedicated industry steward and advocate of the skilled trades and supportive of the committed educators keeping the industry running. We want to work with the next generation of skilled trades students and provide them with the tools and technology they need to make the future a more innovative and efficient place to be.

With our **HVACR System Fundamentals** course we focus on the general knowledge and wiring aspects that graduates are lacking. In the curriculum they will learn how to identify refrigeration system components and be able to describe the role they play in system operation. They will also learn to trace electrical circuits using a wiring diagram and a hands-on trainer. The outcomes of this course will be a student that can correctly perform system component wiring tasks, correctly perform maintenance tasks including replacing filter driers, TXVs, and compressors.

The **HVACR System Troubleshooting** course concentrates on electrical and mechanical issues impacting HVACR systems. Using the Copeland Mobile app, students will learn how to locate information and troubleshoot products. Using the trainers, we show how to evaluate system conditions to troubleshoot refrigeration system issues. Once completed students be able to demonstrate proper mechanical and electrical troubleshooting service practices.

The **Compressor Operation and Maintenance** course will describe the design, construction and operation of scroll, hermetic, and semi-hermetic compressors. The course will then show how to calculate compression ratios for the compressors. Along with common causes of compressor failure and root cause diagnosis. Once completed the students will perform a compressor teardown, inspection, and failure analysis.



HVACR
Mobile Apps



HVACR
Educator Resources

Copeland.com

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HVACR System Fundamentals

Copeland™ Refrigeration Certifications

NC3 and Copeland help shape tomorrow's workforce through certification programs, industry supported curriculum and hands-on training. Students receive classroom instruction on refrigeration system components and maintenance procedures.

PROGRAM OBJECTIVES

- Identify refrigeration system components and describe the role they play in system operation.
- Describe the role of refrigerant in a refrigeration system.
- Calculate superheat and sub-cooling.
- Recover refrigerant from a refrigeration system and perform a system evacuation.
- Charge a refrigeration system with refrigerant.
- Trace electrical circuits on a refrigeration system using a wiring diagram.
- Gather basic pressure, temperature and electrical system operating information from a working system.

PROGRAM OUTCOMES

- Students that complete the HVACR System Fundamentals certification will demonstrate their understanding of electrical and mechanical operation of an HVACR system.
- Students that complete the Refrigeration System Electrical Operation and Maintenance certification will correctly perform system component wiring tasks.
- Students that complete the Refrigeration System Mechanical Operation and Maintenance certification will correctly perform refrigeration maintenance tasks including a replacing system filter drier, low-pressure control, valve plate, and compressor.



COURSE CONTENTS INCLUDE:

- Working with Copeland Mobile Apps
- HVACR System Fundamentals and Best Service Practices
- HVACR System Components
- Compressor Fundamentals
- Refrigerants and Oils
- Refrigerant Recovery, Evacuation and Charging

HANDS-ON TRAINING

Students perform electrical and wiring tasks using a Copeland Refrigeration System Simulator.



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Copeland is a proud partner of the National Coalition of Certification Centers. Copeland Certifications are developed and administered by NC3 (National Coalition of Certification Centers) and are compatible with other industry recognized certifications. For more information, contact NC3 at nc3.net.

HVACR System Troubleshooting

Copeland™ Refrigeration Certifications

NC3 and Copeland help shape tomorrow's workforce through certification programs, industry supported curriculum and hands-on training. Students receive classroom instruction on refrigeration system components and maintenance procedures.

PROGRAM OBJECTIVES

- Diagnose electrical and mechanical issues impacting refrigeration systems.
- Use Emerson Mobile Apps to locate information and troubleshoot products.
- Perform troubleshooting tasks to resolve refrigeration system issues.
- Evaluate system conditions to troubleshoot refrigeration system issues.

PROGRAM OUTCOMES

- Students that complete the HVACR System Troubleshooting certification will demonstrate proper mechanical and electrical troubleshooting service practices on a refrigeration system.
- Students that complete the HVACR System Troubleshooting certification will correctly perform refrigeration maintenance tasks including a replacing system filter drier, low-pressure control, valve plate, and compressor.



COURSE CONTENTS INCLUDE:

- Working with Copeland Mobile Apps
- HVACR System Troubleshooting
- Electrical Motor Applications

HANDS-ON TRAINING

Students perform refrigerant pump down and component replacement tasks using a Copeland Refrigeration System Simulator.



COPELAND

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HVACR Compressor Operation and Maintenance

Copeland™ Refrigeration Certifications

NC3 and Copeland help shape tomorrow's workforce through certification programs, industry supported curriculum and hands-on training. Students receive classroom instruction on compressor operation principles.

PROGRAM OBJECTIVES

- Describe the design, construction and operation of scroll, hermetic, and semi-hermetic compressors.
- Calculate compression ratio.
- Recognize common causes of compressor failure and identify methods of prevention.

PROGRAM OUTCOMES

- Students that complete the Compressor Inspection certification will demonstrate their understanding of compression mechanical and electrical operation.
- Students that complete the Compressor Inspection certification will correctly perform a compressor teardown, inspection and failure analysis.



COURSE CONTENTS INCLUDE:

- Compressor Fundamentals
- Air Cooled Semi-Hermetic Compressors
- Refrigerant Cooled Semi-Hermetic Compressors
- Reciprocating Hermetic Compressors
- Scroll Compressors
- Capacity Modulation
- Causes of Compressor Failures and System Connections

HANDS-ON TRAINING

Students perform an inspection and analysis to identify potential causes of failure.



COPELAND

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